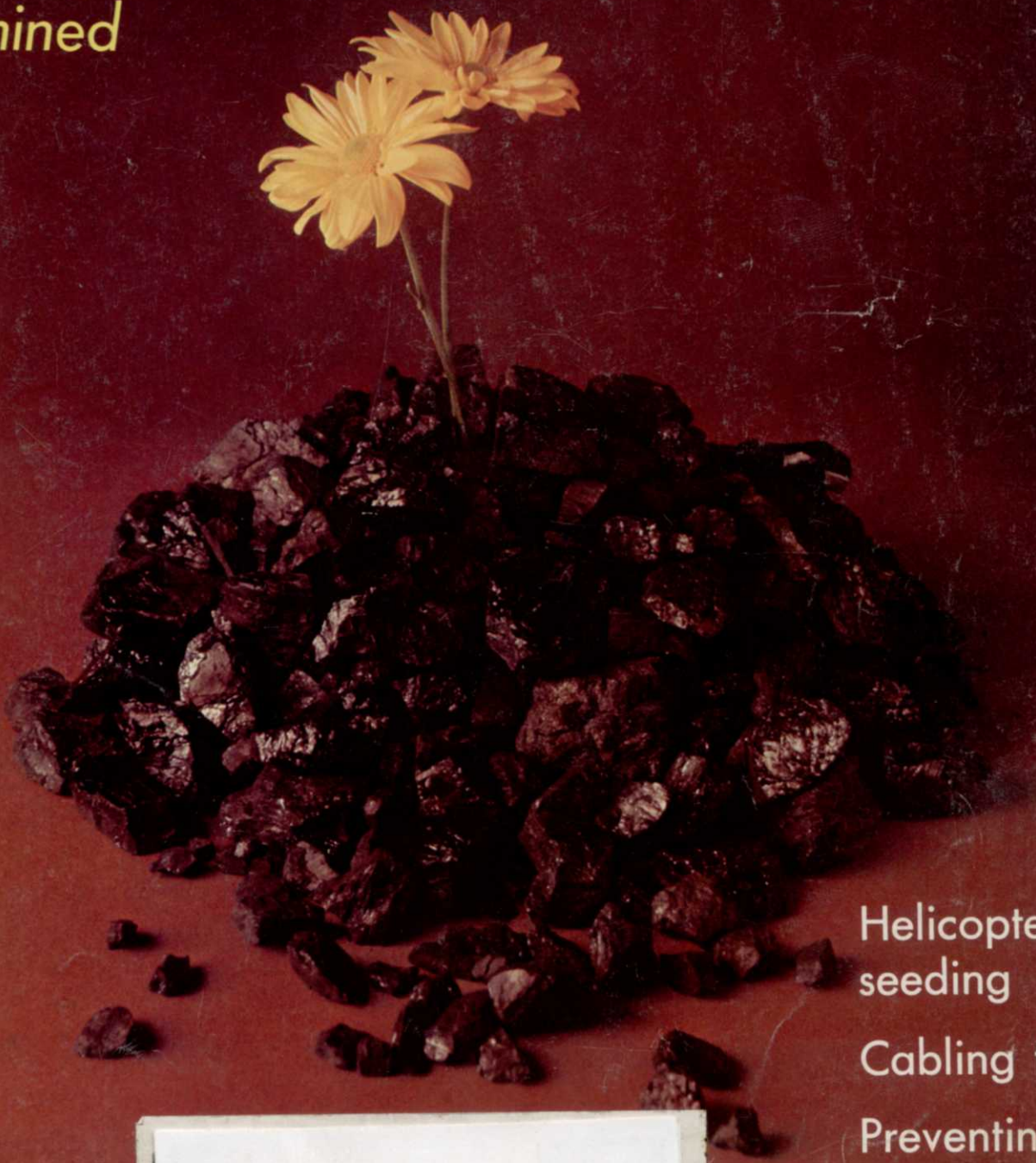
WEEDS TREES & TURF

ONE DOLLAR • NOVEMBER 1976

New hope for mined land



Helicopter seeding

Cabling trees

Preventing fertilizer burn

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WEEDS TREES & TURF®

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Government News

EPA has issued a statement on the "use of registered pesticides for control of pests not named on label on agricultural and non-structural pest control." The Pesticide Enforcement Policy Statement (PEPS) #5, defines what constitutes a knowledgeable expert and allows each state to decide whether or not to designate such experts. Experts, who must have extensive qualifying experience or a combination of qualifying education and experience, will have authority under defined limitations, to make recommendation for conditions under which registered pesticide may be used to control a pest not named in registration.

The question of plant toxicity was referred to the Consumer Product Safety Commission by the Federal Trade Commission. FTC voted to hold in abeyance other aspects of proposed plant labeling regulation.

Research on aquatic weed control and on the classification of economically important plant species will be conducted by Pakistani scientists under two foreign currency grants awarded by the USDA for a total of $372,380. Pakistani scientists will test the possibility of using a pathogen to control water hyacinth. They will extract a toxin produced by the organism that causes water hyacinth blight, Alternaria eichorniae, establish its chemical structure, design a control program for its use and determine its effect on the total aquatic environment.

A two-volume study on the relationship between wildlife and the highway environment sponsored by the Federal Highway Administration is available. Highway-Wildlife Relationships focuses on past efforts and future needs for establishing and preserving wildlife habitats along the 20 million plus acres devoted to highway rights-of-way. Copies of reports FHWA-RD-79-4 and 5 can be obtained from the National Technical Information Service, Department of Commerce, 5285 Port Royal Rd., Springfield, Va. 22161.

Agricultural representatives of the U. S., Mexico and Canada have signed the North American Plant Protection Agreement to unify efforts to solve "continental" pest problems. Formalizing working relations among Mexican, American and Canadian plant protection agencies, the agreement also gives legal authority to programs, standards and regulations adopted for pest control throughout North America, allows anti-pest programs to be merged when necessary and makes regulations governing such procedures as international garbage disposal and importation of used farm equipment more uniform.

A new microbial pesticide for tussock moth control has been approved by EPA. The natural occurring virus is devastating against the tussock moth but is otherwise apparently harmless. The moth is the ancient scourge of the Douglas-fir forests of the Pacific Northwest.

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The insects: Lawn chinch bugs, Ants, Armyworms, Clover mites, Springtails (Collembola), Crickets,

turf insects than turf insecticide.

Cutworms, Digger wasps, Earwigs, Frit flies, Lawn billbugs, Sod webworms (Lawn moth), Sowbugs, White grubs (such as Japanese beetle larvae), Brown dog ticks, Bermuda mites, Chiggers, Fleas, Leafhoppers, Millipedes, Rhodes-grass scales.

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Or write us.

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Diazinon

Above: special aerial bucket carries enough seed for eight acres. Right: an altitude of 45 feet with a speed of 45 miles per hour yields a swath width of 45 feet.

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Over seeding by helicopter

a case study

When Landscape Contractor John Perkins learned of an erosion control job for over seeding on I-35 in Iowa, he decided to go after it. He also decided to use a helicoper. Here is his first-hand step-by-step report on this successful project (from a presentation at the August Denver Symposium of Associated Landscape Contractors of America).

For some years, the Roadside Development Section of the Highway Commission, as it was known before it became the Highway Division of the D.O.T., had used a stabilizing crop seeding on newly graded secondary, primary and interstate highways.

This seeding consisted generally of Winter Rye and Ky. 31 Fescue in the spring, Sudan grass in the summer, and Winter Rye and Hairy Vetch in the fall. In addition all areas not seeded by Sept. 30th were either rough disked, disked or mulched, with the mulch tilled into the soil with a mulch tiller and left over winter. This would put the areas in shape for over seeding in the spring.

Iowa has for many years practiced the over seeding of legumes in the spring into areas which had been fall seeded with grasses. This was usually done with the hand Cyclone seeder. So Iowa was well organized when the D.O.T. decreed not more than 750,000 square feet could be disturbed with one grading spread before some method of soil stabilization had to be followed.

Previously when we moved onto a seeding project in the spring, we were required to disk or till up all the growth from the stabilizing crop of the previous year. Then it was suggested that if the grass and legume seed could be applied in early spring, it could be seeded directly into existing mulch without further manipulation of the soil. This would provide about six to eight weeks longer for the growing season.

The Highway Commission began letting erosion control contracts with provision for early spring over seeding of certain areas which had been seeded with stabilizing crop the previous season. The specs read: "Seeding shall be performed between March 1 and April 15, while the soil is friable and subject to freezing and thawing action."

One of the projects in the letting for the fall of 1970 was an erosion control job that called for early over seeding of previously stabilized areas on I-35 in southern Iowa. It looked like a project that would fit our organization but I knew it would be virtuously impossible to depend on conventional equipment for the spring over seeding. Then I thought about using a helicopter.

I found an operator who was interested, but he would have to purchase a $2000 aerial bucket. We then had to work out from the volume of the bucket how much seed he could carry by volume and weight to find out how many acres he could cover in each trip. We worked out a tentative price per acre and I eventually was awarded the project.

In Iowa the contractor supplies everything required to perform on the project — equipment, labor, seed, mulch, inoculation and fungicide. The specifications provide that legumes must be applied within eight hours of inoculation, that a fungicide be applied to all seed, and that a sticking agent be used to make the fungicide and inoculation stick to the seed. This means the seed must be mixed on the job. Contractors had been using a large auger wagon for this mixing operation and this seemed satisfactory.

Since the contractor is responsible for the entire operation, he must make arrangements with the aerial operator who supplies the plane or helicopter, the pilot and usually one man on the ground with a pickup containing maintenance equipment, fuel and a two-way radio. The

Proper altitude and speed are essential for even seeding.

pilot is the key man. The contractor should review the project with the pilot together with the on-the-job representative of the contracting authority.

The pilot must cover the area designated for each seed load and he must do this while flying at the proper altitude, which from our experience is 30 to 45 feet. He must travel at the proper ground speed, about 40 to 45 miles per hour. The width of the swath seeded will vary with the altitude and ground speed. With the figures we mentioned, the swath will be 40 to 45 feet wide. There will be funneling and streaming of the seed if the speed is too fast. For best results the wind should not be over 10 m.p.h. and not gusty.

This means you might wait several days for proper conditions, or get underway and be forced to shut down. There are always variables, but with aerial seeding you can cover 30 to 50 acres an hour.

Another consideration is whether to use a helicoper or fixed wing plane. Our experience is only with a helicopter. It can land in tight quarters, it can get into smaller areas, go up and down over obstacles easier, and doesn't need a runway.

A helicopter or small plane can carry enough seed for eight acres. We normally stake out two eight acre plots so that the pilot can calibrate his seeding equipment and then the balance of the project into 32 acre plots to give him some guidelines as the work progresses. To be sure the coverage is 100 percent, the seeder can be set at one half rate with two passes made over each area.

Safety is important. The contractor, the contracting authority representative and the pilot must drive through the job and note all obstacles such as high lines, bridges, trees, and even fences. Some may need flagging.

You might wait several days for proper conditions, or get underway and be forced to shut down.

The ground crew handling the seed needs to be aware that if you challenge a turning rotor or propeller you always come out second best. In order to get production, the engine must be kept running, the rotor or propeller turning, and the seed hopper filled in very close proximity.

Be sure your aerial operator is insured for liability, property damage, etc., to cover his operation while he is on your project.

In the years 1971 through 1975 in Iowa there were 352 miles of roadway consisting over 9611 acres that were over seeded. The State estimates the savings to be $1,897,-742, mostly generated by the saving of tillage, and by not applying mulch on the over seeded area.

Some contractors may think that with less dollar volume, their profit is taking wing along with the helicopter. I believe there has been enough work added, such as ditch work, to more than make up the difference. The opportunity for profit is still there for a well-managed. outfit. □

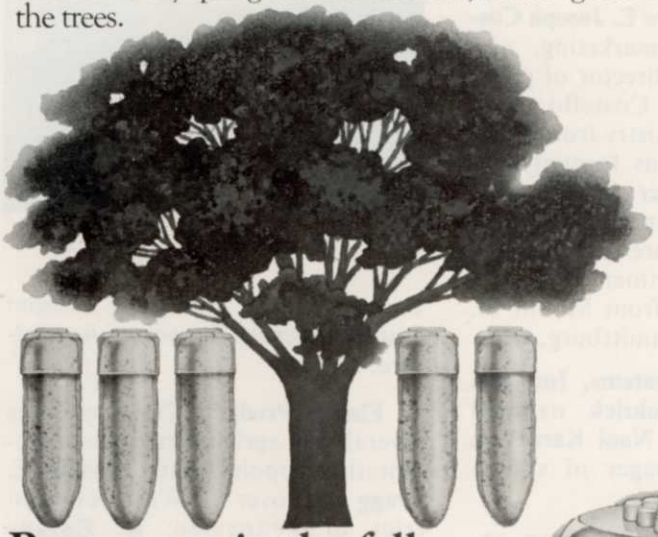
"I like to send trees into winter in good, healthy condition. That's why I feed in the fall with Jobe's Spikes."

Frank Lamphier, Superintendent Aspetuck Valley Country Club, Weston, Connecticut

"Last winter, we had three weeks when the temperature was never above 10 degrees. Weather like that is rough on trees, so I believe in sending them into winter in the best possible condition. We use Jobe's Spikes on everything in the fall...willows, evergreens, maples, all our trees and shrubs."

Jobe's makes good fall or winter fill-in work.

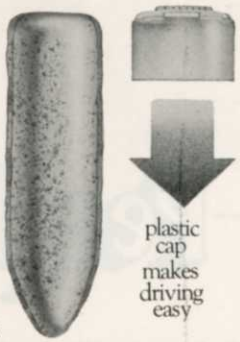
When work slacks off, it's time to get busy with Jobe's® Tree and Shrub Spikes. It helps eliminate one chore from the busy spring-summer months, and it's good for the trees.



Roots grow in the fall, so feed them in the fall.

Feeding with Jobe's Spikes in the fall while roots are growing helps overcome weakness brought on by summer heat, lack of moisture and ravages of insects. Helps trees get through winter in shape for a strong start in the spring. Just pound Jobe's Spikes into moist ground at the dripline at the rate of 1 per inch of trunk diameter.

Frank Lamphier says, "Jobe's Spikes are long lasting. When we use them in the fall, the trees get nourishment for the winter. Then, when spring rains start, the balance of the fertilizer is released to shoot them off for spring. We think one Spike does more good than one to two pounds of ordinary fertilizer."



"Jobe's Spikes work!"

"We started 12-inch pine seedlings 4 years ago, and now they're 6 to 8 feet tall. We fed them at transplanting with Jobe's Spikes and have fed them ever since with Jobe's. Growth like that really sold me." University leaching studies have shown that Jobe's Spikes are as effective as drilled fertilizer. Rainwater carries nutrients from the Spike to the root zone to a depth of at least 24 inches.

Jobe's Spikes are better than surface-applied fertilizer. You don't worry about run-off losses or about burning turf or causing excessive turf growth around trees.

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A hammer is all the equipment you need with Jobe's Spikes. No bulky auger to carry from job to job. Nothing to break. No maintenance costs. No fertilizer bags to tear or spill.

Jobe's Spikes are a pre-measured amount of 16-8-8 fertilizer formed into a rigid, easy-to-drive spike.

"Jobe's Spikes don't take much space, or time."

"I can send a man out on a 3-wheel cart with enough Spikes to last all day.

"Working fast is important because I have just 7 men, and only 4 year-round. We're working on a major landscape program with trees and shrubs to improve the looks of the course. Jobe's Spikes really save us time."

Jobe's Evergreen Spikes 12-6-8 and Fruit Tree Spikes 5-15-15 are now available in bulk packs. They can be combined for shipping with Tree and Shrub Spikes.

Call your local Jobe's distributor or order direct. $30 per case (105 Spikes) prepaid, 5 case minimum. 15 or more cases, $25 per case.

The easy method for professional tree care. International Spike, Inc., 462 East High Street, Lexington, Kentucky 40508.

People on the Move

Robert J. Nicolazzi has been appointed general marketing manager for **Ford Motor Company's** worldwide tractor operations. Nicolazzi joined the company in 1963 as a purchasing coordinator. He has held numerous positions in planning, marketing, purchasing and sales at the company's European tractor operations and at Ford's North American Tractor & Implement Operations. He holds a degree in business administration from the University of Notre Dame.

Diamond Shamrock announces three new appointments in the agricultural chemicals division. **Doctors Myron Bliss Jr.** and **Gary L. Eilrich** have been named managers of field

L. F. Cherry

development and **L. F. Cherry** has been named national field sales manager.

Drs. Bliss and Eilrich will be responsible for the planning and progress of appropriate field research at universities and in-house field research to improve efficiency in defining product utility and development of data in support of federal registrations. Cherry's responsibilities include management of the field sales force, including the five regional offices, managers, and their sales forces.

Cherry joined the company in 1962 and was district sales supervisor for eight years before his most recent prior appointment as Midwest regional sales manager for the division in 1970. Bliss holds a Ph.D. in Entomology from Pennsylvania State University. Eilrich received his Ph.D. in plant pathology from the University of Illinois.

Two new appointments in the specialty chemicals division of **ICI United States Inc.** are **E. Joseph Costello,** director of marketing, and **Thomas J. Galvin,** director of product development. Costello, who holds a B.S. in chemistry from Villanova University, was formerly national sales manager for the division. Galvin, formerly assistant director of the venture appraisal and development department, holds a B.A. in chemistry from Mount St. Mary's College, Emmitsburg, Md.

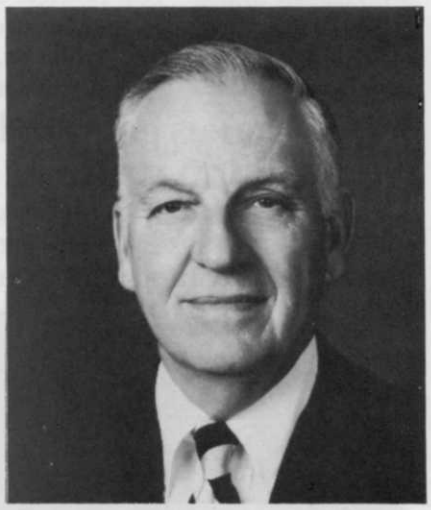
Dicoa Irrigation Systems, Inc. has named **Richard Bobrick** national sales manager and **Nani Karu** vice president and manager of system engineering.

Thomas M. Rooney has been appointed western retail district manager for the agricultural chemicals division of **Vistron Corp.** In his new post, Rooney will direct the operations of 45 of Vistron's Sohigro retail outlets in a five-state area in the Midwest.

Jeff Raymond, Applied Biochemists Inc. southeastern regional salesman, adds five new states to his territory: Indiana, Kentucky, Michigan, Ohio and Tennessee.

Monsanto Agricultural Products Company has named **Daniel M. Donahue** Roundup herbicide industrial sales representative for the southeastern United States. Donahue joined the company in 1972 as a sales representative in the Mankato, Minnesota district. He holds a B.S. in agriculture economics from South Dakota State University.

Joining the **Toro Company** sales staff as marketing representative for the Pacific Northwest is **Robert M. Morgan.** Morgan, a native of Portland, Ore., and a former president of the Sprinkler Irrigation Assoc., has over 40 years in the sprinkler irrigation and farm equipment areas. He



Robert M. Morgan

was graduated from the Oregon State University School of Agriculture.

Elanco Products Co. announces several new agricultural sales representative appointments. **Ronald E. Bragg** will cover the West Delta district in Tennessee; **R. Eugene Eubanks** joins the Omaha district; **Nicolas R. Herbert,** the South Delta sales district in Louisiana; **Robert E. Rushton,** Columbus sales district, Michigan; **Kathleen M. Wilson,** Minneapolis sales district; **Michael D. Simpson,** Dallas; **Brett M. Oemichen,** Minneapolis, **C. Levon Martin,** Atlanta East. All of these sales representatives have prior sales experience with the company.

At **Ciba-Geigy Corp., Norm Thomsen** transfers to a Virginia territory for the agricultural division. His territory covers 38 counties in eastern Virginia. His most recent prior position was merchandising specialist. **Ted Ramirez** joins the company as a field sales representative serving 41 counties in southern Louisiana. He comes from the U.S. Department of Agriculture Statistical Reporting Service.

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WHY A FERTILIZER BURNS

by William Knoop

In the development of a nitrogen nutrition program, the turfgrass manager has the choice of applying soluble nitrogen or slowly soluble nitrogen, or applying a fertilizer that contains a combination of soluble and slowly soluble nitrogen sources. As a result of higher fertilizer prices and supply shortages during the past few years, turfgrass managers have tended to use more soluble nitrogen fertilizers than before.

One of the characteristics of soluble nitrogen fertilizers is their increased tendency to "burn" turfgrasses. The risk of fertilizer burn is one of the reasons why many turfgrass managers have tended to use nitrogen fertilizers that contain a high percentage of slowly soluble nitrogen rather than the totally soluble nitrogen fertilizers.

Soluble nitrogen fertilizers, if applied properly, can be just as effective (as a slowly soluble nitrogen source) in providing the turfgrass plant with the nitrogen it requires. The risk of burn may be minimized if the factors that contribute to a burn are understood.

Fertilizers contain salts. These salts are not unlike table salt except that they contain various plant nutrients. When a salt is added to water the osmotic pressure of the solution is increased. Osmotic pressure is, in a sense, a measure of how tightly water is held in a solution. When a fertilizer, either as a solid or a liquid, is applied to the surface of the soil, the fertilizer salts must sooner or later enter and become a part of the soil solution before the nutrients can enter the roots and be used by the turfgrass plant. The increase in the osmotic pressure of the soil solution associated with the application of a fertilizer may determine whether the plant will survive or will die from a fertilizer burn.

For a plant's root system to take in water, the water must pass through a root cell membrane. Water can pass through this membrane only when the osmotic pressure of the solution inside the cell is higher than the osmotic pressure of the soil solution outside the cell. Water moves from a solution with low osmotic pressure into a solution with higher osmotic pressure. If the osmotic pressure of the soil solution becomes higher than that of the solution inside the cell, water cannot enter the cell and may even move out of it. This results in the death of the cell. When root cells die, the whole plant may die. The end result is termed a "fertilizer burn."

An understanding of the potential salt effect of the various fertilizer materials can help prevent possible fertilizer burn. Salt index values are a measure of a material's relative tendency to increase the osmotic pressure of the soil solution as compared with the increase caused by an equal weight of sodium nitrate. The salt index of sodium nitrate is 100. The higher the salt index, the greater the potential of a material to increase the osmotic pressure of the soil solution and thus the potential for burn. As indicated in Tables 1 and 2, there are wide differences in the salt indexes of those fertilizer materials used.

Note that Table 1 also lists the salt indexes of selected nitrogen fertilizers in terms of single units of N. Nitrogen is applied on a unit basis (i.e., pounds per 1000 sq. ft.). Although a material such as ammonium sulfate has a lower salt index than urea, the salt effect of applied urea is lower because it contains a higher percentage of N.

The potential for burn is not totally dependent on the salt index of the fertilizer material. The moisture status of the soil and of the turfgrass plant is also important. If the level of the soil solution is low, a fertilizer will have a greater effect on increasing the osmotic pressure of the soil solution. When a fertilizer is "watered in," the volume of the soil solution increases and thus the osmotic pressure of the soil solution is reduced. In well drained soils, however, heavy applications of water, while having the beneficial effect of reducing the osmotic pressure of the soil solution, may also have the harmful effect of leaching nutrients past the root system.

The water status of the plant is affected by both the air temperature and the humidity, which is the amount of water in the air surrounding the plant. These factors to a large degree affect the plant's water requirements. As the air temperature increases, the plant requires more water and as the humidity decreases the plant requires more water. As the osmotic pressure of the soil solution increases, less and less water is available to the plant. Watering in a fertilizer material may increase the water available to the root system by decreasing the osmotic pressure of the soil solution, but may also aid in reducing the plant's water requirements by cooling the plant and increasing the humidity of the plant's microenvironment.

Soluble fertilizer materials may be used at any time of the year with minimal risk of damage to turf if the factors that contribute to a burn are understood. The salt index of a fertilizer material is extremely important, espcecially when the fertilizer is highly soluble. The rates of application must be lower when a fertilizer with a high salt index is used, basically because of the salt effect.

Fertilizers with a low salt index should be used when soil test results indicate the presence of excessive levels of soluble salts in the soil. □

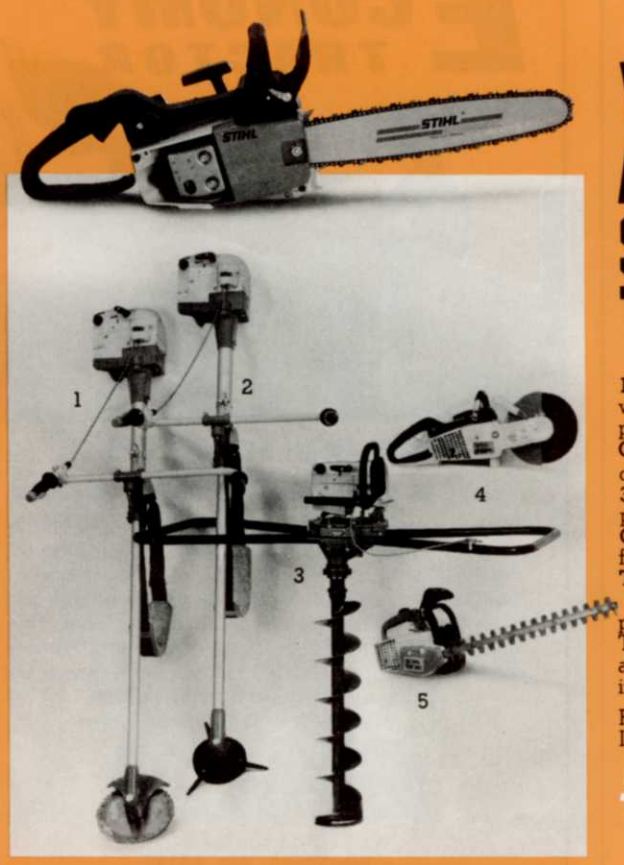
Mr. Knoop is assistant professor of horticulture at Iowa State University.

TABLE 1. Salt Index Values for commonly used nitrogen fertilizer materials.

Material	Approx. % N	Salt Index	Salt Index per Unit of N
Ammonium Nitrate	33	105	3.2
Ammonium Sulfate	21	69	3.3
Calcium Nitrate	12	53	4.4
I.B.D.U.	31	5	0.1
Potassium Nitrate	14	74	5.3
Natural Organic	5	4	0.8
UF	38	10	0.3
Urea	45	75	1.7

TABLE 2. Salt Index values for other commonly used materials.

Material	Approx. Nutrient Level	Salt Index
Superphosphate	20% P_2O_5	8
Potassium Chloride	60% K_2O	114
Potassium Sulfate	50% K_2O	46
Dolomite	30% CaO 20% MgO	1
Gypsom	33% CaO	8
Epsom Salts	16% MgO	44



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Ted Collins, president of the Victor-based tree and landscape company bearing his name, has begun a new policy of giving employees a greater voice in company management.

With the formation of "The Green Team," the sales, production and office staffs appoint representatives to meet regularly with Collins to air differences, provide suggestions for smoother operation of their departments, and keep Collins in tune with employee needs and desires.

"This is not," says Collins, "A squaring off of management and employees. Department heads and other company officers are not invited to Green Team meetings. It's simply the team and me around a table. Many of their suggestions have been implemented, others are under further consideration.

"The real benefactor of this management system is our customer. Every suggestion made so far by The Green Team has been for better customer service. We in management are often removed from direct contact with the customers, whereas our Green Team members are in constant touch with the public, so their advice has been very service oriented.

"Of course, this works both ways," Collins continued, "Green Team meetings give me an opportunity to candidly discuss management's views without it sounding like an edict. And, when a situation is thoroughly reviewed and team members know the reasons for our position, they can better communicate that to their peers."

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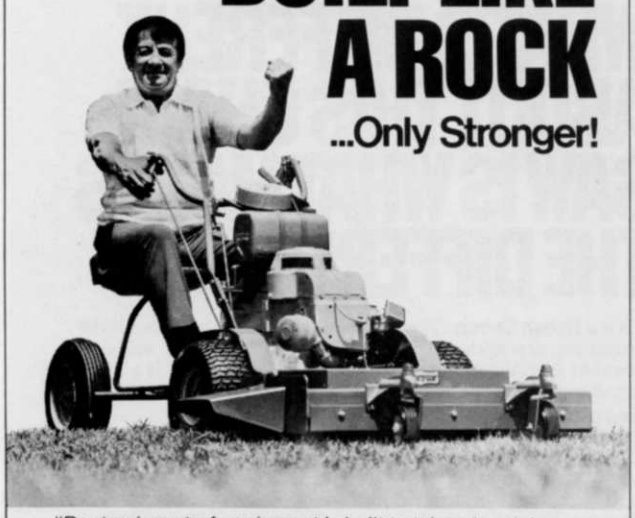

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Grading and shaping for erosion control and rapid vegetative establishment

by F. W. Glover, USDA Soil Conservation Service, Marshall Augustine, consultant to Hittman Associates, Inc., and Michael Clar, engineer, Hittman Associates, Inc.

Erosion control of lands in humid areas drastically disturbed by coal surface mining is strongly influenced by four principal factors: climate, soils, vegetation, and topography. The climate for any given region is fixed. Man's control over climate is very limited. But he can schedule sensitive field operations around the local weather patterns. Vegetation is the most flexible of these factors. Plant materials are available for almost any situation in the humid regions of the United States, provided their establishment is supported by known conservation measures and if the soils and topography are suitable.

Objectives

The basic objective of an erosion control program for a surface mined area is to stabilize the disturbed area. When the area is stabilized, the volume of sediment generated will be minimized and off-site damage reduced. Therefore the principal objective of grading and shaping operations should be to manipulate the soil and topography to assist in the control of surface runoff, thus reducing erosion and improving effective vegetative establishment.

In addition, there are several secondary objectives. The grading and shaping features of an erosion control program must also be compatible with the land use planned for the area after mining and reclamation are completed. The soil and topography required should be identified before making the grading plan.

Plans for grading and shaping should include making full use of the materials or land resources at the site. Large rocks and boulders can be buried or they can be placed on toeslopes to make use of their properties of resistance to weathering. If durable, they can be used as rip-rap for stabilizing waterways or as special features on recreation sites. Brush and other woody materials can be windrowed at the toe of fills and used as a partial filter. They can be fed through a woodchipper and used as a mulch for soil stabilization. The potential use of all materials at the site should be considered in preparing the min-

ing plan and in determining the use of the land after mining.

As a minimum the grading and sloping operations must conform to state laws. Most states have grading specifications included in their reclamation requirements. These specifications usually require that the peaks and ridges be reduced by grading to a rolling, sloping, or terraced topography. Areas reclaimed for uses such as forest plantation and wildlife may require less grading than for other uses. In addition some states require that acid-forming material be covered with a minimum depth (2 to 4 feet) of material suitable to support plant growth. Most states have set a time limit on the completion of the reclamation operations; a 2- to 3-year limit is most common.

Soil Characteristics

Soil materials resulting from mining have physical and chemical characteristics unique to each site. The physical-chemical characteristics of the soil materials at a particular site must be known and considered in planning the shaping and grading operations. The characteristics of such soils that most influence the stated objectives include the toxicity or potential toxicity of the material and the capacity to hold water.

Potentially toxic acid-forming material can be handled in two ways. It can be buried in the surface mine pit or it can be neutralized by adding lime. If the toxic material is identified, segregated, and stockpiled, it can easily be placed in the bottom of the pit. There are fewer problems in establishing and maintaining vegetation where potentially high acid-forming materials are covered with soil material favorable to plant growth.

The water-holding capacity of the material is the key to erosion control on most sites. Other soil characteristics that have a strong influence on the erosion potential of a soil are texture, organic matter content, percent slope, and effective length of slope.

Soil texture refers to the size and proportion of particles making up a particular soil. Soil texture classes

Grading for new vegetation — The Princess Susan Coal Corp., Charleston, W.Va.

New life at the Piney Creek Coal Co., Beckley, W.Va.

grading and shaping

are determined by the relative amounts of sand, silt, and clay. If sand is dominant, the soil is coarse-textured or "light" and allows water to infiltrate more rapidly. Too much sand, however, may make the soil too droughty for plant estalishment. Clay particles are dominant in fine-textured or "heavy" soils, which are often quite cohesive and slow to erode. Soils high in silt and very fine sand and low in clay and organic matter are generally the most erodible.

Organic matter is plant and animal residue in various stages of decomposition. The organic matter content of a soil has an inverse relationship to erodibility. As the amount of organic matter in a soil increases, the capacity of the soil to absorb surface water increases. As a result, runoff is reduced. Soil materials that result from mining operations are generally lacking in near-surface concentrations of soil organic matter. Deficiencies in near-surface organic matter can be remedied through establishment of vegetative cover and proper maintenance. Superior long-range benefits may be obtained by controlled deep incorporation of organic matter recovered from the original surface soil.

The ability of a soil to hold water depends on texture, soil depth, and organic-matter content. Soils that are able to hold large quantities of water are desirable from a plant growth standpoint, although some clays with excessive holding capacity cause problems.

Grading Considerations

Scheduling and Seasonal Limitations

Seasonal climatic variations play an important role in the scheduling of grading operations. The amount of rainfall and runoff during different periods of the year influences erosion. Because the soil is so vulnerable to erosion during the grading activities, those activities should be scheduled to coincide with the periods of low precipitation. The spring and early summer months often have the highest precipitation rates. Therefore, the bulk of grading operations, especially in critical areas, should be scheduled for midsummer and fall.

Soil stability is another consideration. Proper compaction cannot usually be obtained during the winter months when the ground is frozen. In early spring the ground is often too wet to be handled properly, and mud can impede the operation of grading equipment.

If there is a choice, it is better to grade during the most favorable time for seeding. From a moisture and temperature point of view, April, May, and June in the spring and late August, September, and October in the fall are the best times to seed for uniform emergence and seedling growth in West Virginia, Maryland, and Virginia.

Topographic Manipulations

The rate of runoff and, correspondingly, the rate of soil erosion can be controlled by manipulating the slope gradient and effective length of slope. Such control is particularly significant in area mining and mountaintop mining.

Slope design should be based on the erodibility of the surface soils, as well as the need to stabilize against mass earth movement. Return to approximate original contour, as required by most state laws, may not be desirable in all cases. A reduction in relief and an overall flattening of the topography is not only desirable from an erosion control standpoint, but may be necessary to convert the site to another type of land use. It must be remembered that shorter and flatter slopes are less erodible.

Where there is little flexibility as to the overall configuration of the slope, as is often the case with contour mining in steep terrain, diversion structures, such as reverse benches or terraces, ditches, and dikes, can be constructed above and along the spoil slopes to decrease the overall length of the slope.

Soil Surface Manipulations

The soil surface can be manipulated to reduce and detain runoff. Manipulation includes roughening and loosening the soil, mulching and revegetation, and topsoiling and adding soil amendments.

A roughened and loosened soil surface improves water infiltration, slows the movement of surface runoff, and benefits plant growth. Common methods of loosening and/or roughening a soil surface include scarification, tracking, and contour benching or furrowing. Scarification is usually accomplished by disking or harrowing on the ground contour, but it can also be done by a crawler tractor equipped with ripper bars or by dragging the teeth on the bucket of a front-end loader over the ground.

Tracking is done on steep slopes where equipment cannot be moved safely along the ground contour. It is accomplished by running a cleated crawler tractor up and down the slope. When this method is used, it is important that the cleat marks overlap. The cleats leave shallow grooves that run parallel to the contour. If the slope is not too steep, furrows can be made on contours by angling the dozer blade. Some overtopping of these furrows occurs, but they help control erosion.

The prompt establishment of a cover of vegetation or the placement of a fibrous, organic mulch on a denuded soil surface also reduces and detains surface flow. Additionally, it stabilizes the soil. Vegetation or mulch protects the surface

and prevents the soil from being compacted and sealed during a rainfall. Live vegetation and mulching materials make the soil more porous and remove soil moisture.

The permeability of the surface soil also has a major bearing on the rate of surface runoff. If the soil remaining after grading is highly impermeable, it may be desirable to top-dress the graded area with a more suitable soil. This process should enhance revegetation efforts. Decreased surface runoff is a secondary benefit.

Commonly used equipment for grading and shaping are dozers, pull scrapers, motor scrapers, trucks, and high lifts. Power shovels, gradalls, and draglines are sometimes used in the backfilling operation.

The types of equipment used influence the quality of the final grading and shaping. Some compaction is needed to improve slope stability. However, the surface or root zone should be loose to permit water movement and good plant growth. The type of equipment used will have an effect on these conditions.

Guidelines for Grading and Shaping

Scheduling of Operations

Grading and shaping operations should be scheduled with two objectives in mind. The first objective is to minimize the total surface area disturbed at any one time. The second objective is to schedule earth moving operations which considers seasonal climatic variations. The schedule should require the shaping and grading operations, including seedbed preparation and mulching, to be conducted as a continuous operation during the best seasons of the year.

Soil Placement

Two major objectives in placing soil materials resulting from mining operations are (1) to provide a stable soil mass and (2) to provide a suitable growth medium. These objectives are extremely difficult, if not impossible, to attain without a thorough analysis of the overburden materials during preplan-

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ning. This analysis will identify potentially toxic materials that must be buried or neutralized. It will also identify the layer of the soil that would be most desirable for plant growth. The occurrence of ground water, particularly aquifers or springs that might saturate and threaten stability of the soil mass, can also be identified and provided for in the soil reconstruction process. Reconstruction should replace old acid soils with nonacid young soils; provide high levels of available plant nutrients (phosphorus, calcium, magnesium, and potassium); replace hardpans and relatively shallow root zones with deeper soils; and provide boulder-free surface soils.

Utilization of Existing Materials

Grading and shaping plans should take advantage of materials present at the site. If clayey materials are present in the overburden material, they can be used to segragate toxic soil materials, create an artificial ground water table, and line the walls and bottoms of water-holding impoundments. Large rocks and boulders, which are usually buried, can also be used to anchor the toes of outslopes and stabilize steeply sloping soils. They can also be broken down and used as rip-rap to stabilize slopes, water courses, and outfalls. Nonmarketable woody plant materials, which are also usually buried, can be processed through a wood chipper and used as a mulch. Before a decision is made to discard any material, it should be thoroughly evaluated for possible use.

Control of Runoff

Grading and shaping are major considerations in the control of runoff. Runoff can be controlled through a combination of surface soil manipulations, topographic shaping, and erosion control structures.

Soil surface manipulations include roughening and loosening the soil, mulching and revegetation, topsoiling, and adding soil amendments. Mulching and revegetation are not strictly shaping and grading operations, but they are generally inseparable from these operations. The shaping and grading operations by themselves cannot do much to prevent rainfall erosion. The impact of falling raindrops can be controlled quickly with mulches and the rapid establishment of grasses and legumes. The preparation of the soil surface through soil surface manipulations will help to keep the mulch in place and establish vegetation.

Topographic shaping is used to control the rate of runoff and to reduce the rate of soil erosion. This objective is accomplished by manipulating the gradient, length, and shape of the slope. In addition, topographic shaping has a major influence on the stability of the slopes. Slope design, therefore, should be based on the erodibility of the surface soils and the stability against landslides.

The grading and shaping operations must recognize the needs of the post-mining land use. These requirements and characteristics vary considerably among the many possible land uses, which include reforestation, recreation, agriculture, and urban development. The elements with the greatest possible variance include slope length and steepness, water supply, storm runoff handling, and selection of plant materials.

Selection of Equipment

The selection of the proper size and kind of equipment for grading and shaping is important. A large piece of equipment (D9 or greater) provides the greatest capacity to move earth. However, it may not be the most economical for grading and finishing the job to the required standards.

Most successful operators have found that a large dozer (D9 or equal) can be used for backfilling and rough grading. After this stage use of a smaller dozer (D-7 or equal) has proved to be the most economical, mainly because of its greater maneuverability. This smaller size equipment has the capability to final-grade closer to requirements and to construct water disposal measures. Long blades and the overall physical size of large dozers limit their use in constructing these water disposal measures.

Equipment selection is also governed by the distance earth has to be moved. General guides are as follows:

Up to 300 feet—Dozer
300 feet to 1,000 feet—Pull scraper
1,000 feet or greater—Motor scraper

Applicable Conservation Measures

Numerous conservation measures have been developed to supplement the grading and shaping operations in controlling erosion and establishing effective vegetation. The applicable measures fall into two major categories: measures for runoff control and measures for soil stabilization.

Measures for Runoff Control

Measures used in controlling runoff can be grouped into three types according to their function. The three basic functions are:

(1) reduction and detention of runoff
(2) interception and diversion of runoff
(3) conveyance of safe disposal of concentrated flow

Measures to reduce and detain runoff include those practices dis-

cussed under surface soil manipulation and topographic manipulation. Included in these practices are:

(a) roughening and loosening the soil
(b) mulching and revegetation
(c) topsoiling and soil amendments
(d) reduction of slope length and gradient
(e) use of concave slopes

Interception and diversion practices are used to intercept runoff before it reaches a critical area and to divert it to a safe disposal area. Interception and diversion practices perform two important functions at surface coal mines. They isolate onsite critical areas (i.e., raw spoils, partially stabilized spoils, highwalls, access roads, and other areas) from offsite runoff. In addition, they control runoff velocities on steep or long spoil slopes and abandoned access roads. Interception and diversion is accomplished through the use of various conservation structures, including reverse benches or terraces, cross-slope ditches, earth dikes, and combined ditch and dike (diversion).

The diversion and the interception of runoff necessitates the conveyance and disposal of concentrated flows. Safe conveyance of concentrated flow requires practices that reduce the velocity of runoff or maintain low velocity, and as a result, control its ability to detach and transport soil particles. In handling concentrated flow, the objective is to safely convey the water without erosion. This is accomplished by designing the measures to withstand the expected velocities. For most vegetated waterways there must be only intermittent flow, and velocity cannot exceed 5.0 feet per second. If greater velocities are expected or base flow or seepage occurs, structural protection is needed such as rip-rap or concrete linings. Other structures such as culverts and chutes can also be used to convey concentrated flows to safe outlets. Temporary storage of runoff in impoundments and energy dissipators (level spreaders, concrete or road blocks, etc.) are other methods that may be used.

Measures for Soil Stabilization

The second category of erosion control measures is soil stabilization. Soil stabilization practices are designed to protect the soil from the erosive action of rainfall, ensuing runoff, and wind. Stabilization measures can be either vegetative or nonvegetative and short term or long term.

Vegetative stabilization refers to the use of different types of vegetation to protect the soil from erosion. Nonvegetative stabilization, on the other hand, refers to a multitude of practices that use materials other than vegetation such as mulch, gravel, etc. in preventing soil erosion. A combination of both vegetative and nonvegetative measures is usually required. □

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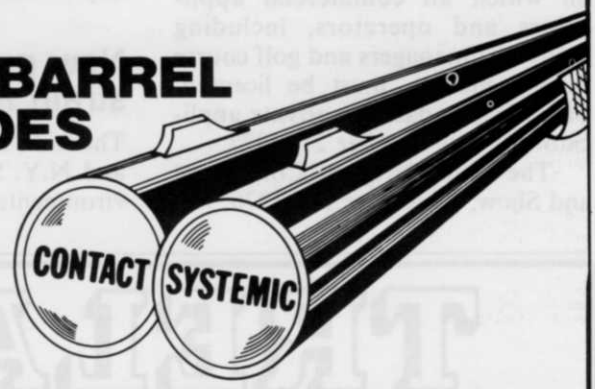

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Industry News

Ohio licensing deadline set

Ohio Governor James Rhodes signed Amended House Bill 1015 on June 2, 1976; it became effective September 1, 1976. This statute establishes March 1, 1977, as the date on which all commercial applicators and operators, including many turf managers and golf course superintendents, must be licensed. The effective date for private applicators is still October 21, 1977.

The Ohio Turfgrass Conference and Show, December 7-8, 1976, will offer an opportunity to obtain training and take the test necessary for licensing. The Program Committee has decided to devote the Thursday morning (Dec. 9) session specifically to pesticide applicator training. The Ohio Department of Agriculture will make the test available Thursday afternoon.

New purpleosier strain released

The U.S. Soil Conservation Service and N.Y. State Department of Environmental Conservation have announced selection and release of an improved variety of purpleosier willow (*Salix purpurea* L.) for streambank protection and repair in the Northeastern U.S. The shrub also has potential ornamental value along streams.

The new strain, named Streamco, is a vegetative increase from a foundation cutting block established in 1943 from cuttings from a naturalized stand near Montour Falls, New York. Extensive testing has shown Streamco superior to other strains and streambank species in steminess, stem presiliency, suckering, and ease of establishment on streambanks.

Streamco is a medium to tall shrub, 10 to 20 feet high, with smooth, slender, tough, resilient branches. It is a thicket-forming shrub that suckers profusely from its roots and spreads by layering of branches. Mature height is reached in five years.

Foundation cutting stock will be maintained by the Soil Conservation Service Plant Materials Center, Big Flats, N.Y., and Saratoga Nursery, operated by the N.Y. State Department of Environmental Conservation, Saratoga Springs, N.Y. Detailed information on test results and applications as well as foundation stock are available to commercial nurserymen from the Soil Conservation Service Plant Materials Center, P.O. Box 295, Rt. 352, Big Flats, N.Y. 14814.

Dow to produce MCPA, MCPP acids

Dow Chemical U.S.A. announced that it will begin production this fall of MCPA and MCPP acids, raw materials for the manufacture of phenoxy herbicides.

Dow currently markets MCPA amine herbicide and will produce the acid not only for its own use but also for export. The MCPP acid, used mainly in lawn and turf herbicides, also will be produced for export.

Production capacity for the two products has been obtained through modification of existing facilities in Midland, Mich., following startup earlier this year of the company's new 2,4-D plant. **Continued**

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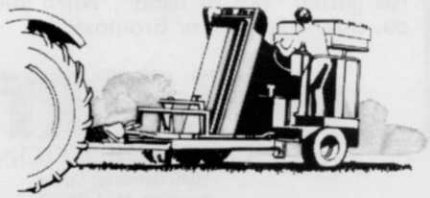

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G = Good F = Fair P = Poor

Article title	Article Contains Useful or Original Information	Points are Clear and Easily Understood	Article is Useful to Me as a Professional	Article is Interesting to Me as a Professional	Article is of No Interest or Use to Me as a Professional
Over Seeding by Helicopter					
Why a Fertilizer Burns					
Grading and Shaping for Erosion Control					
Planning a Golf Course					
Cabling and Bracing Trees					
It's a Jungle Out Here (Park Irrigation)					

Monsanto opens new Lasso plant

Monsanto Agricultural Products Company, manufacturer of Lasso, has announced that a new facility for production of the herbicide will be opened within two months at its Muscatine, Iowa plant. R. J. Mahoney, managing director of this division of Monsanto Company, cited rising market demand for Lasso. The new facility will increase production capacity by 40 percent.

At the same time, Monsanto announced an 8 percent price increase for its Lasso and Ramrod herbicide products, effective immediately.

Mahoney also noted that Monsanto again plans to begin shipments of Lasso and Ramrod herbicides in the fourth quarter of this year.

A.A.N. offers directories

The American Association of Nurserymen has published two directories for nurserymen. *Sources of Plants & Related Supplies* is an annual publication containing 7,000 listings of more than 1,600 varieties of commercially available nursery stock, related nursery supplies, retail products, specialties, and business services.

The 1976-77 edition of *Sources* shows type of stock i.e., liner, bare root, balled and burlapped, container, and whether packaged for retail. In the case of supplies and equipment, the directory shows whether the firm listed for a particular item is the manufacturer or distributor. The book includes a company index showing the name, address, and phone number of each firm appearing in the 1976-77 edition.

The *1976-77 Member Directory*, is a 75-page book which includes the rosters of the American Association of Nurserymen, Garden Centers of America, Horticultural Research Institute, National Association of Plant Patent Owners, Na-

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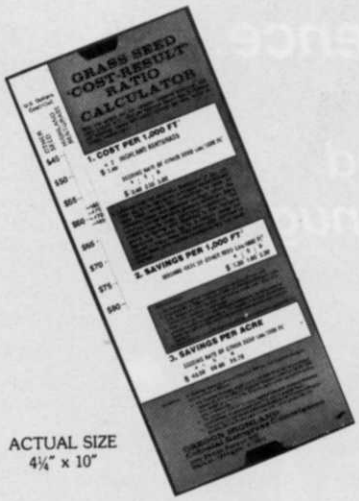

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Budgeting is a Breeze with this Calculator

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Here's a cost-calculator with which you can instantly compare the **actual cost** of various grass seeds.

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So, as in the case of Highland Colonial Bentgrass with its 8 million seeds per pound, you are buying a huge potential. Other grasses, which might cost less per pound may also have less potential grass plants so that from a practical standpoint they're more expensive than Highland.

Why not write for our free calculator. You'll find it a handy, fast method of comparing **actual costs** of planting bluegrass, ryegrass, bentgrass and fescue.

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Continued

tional Landscape Association, and Wholesale Nursery Growers of America, as well as listings for regional and foreign nursery associations and related industry organizations.

Listings are arranged alphabetically by state, and include firm name, address, and phone number; key contact; AAN dues classification; and nursery business code i.e., whether the firm is a grower, retailer, mailorder nursery, landscape professional, or dealer.

A free copy of each publication has been sent to each AAN member. *Sources* is available to non-members at $3 per copy. Additional copies of the directory may be purchased by members for $5 each, and by non-members for $8 each. Both books are available from the American Association of Nurserymen, 230 Southern Building, Washington, D.C. 20005.

Grower policy manual released

The Wholesale Nursery Growers of America has released the second in a series of management publications for the wholesale grower.

Wholesale Nursery Grower Policy Manual: A Preparation Guide presents a range of policy options drawn from manuals used successfully by nurseries nationwide from which growers can develop their own manuals.

The guide covers such subjects as working hours, pay periods, wage and salary advances, inclement weather policy, profit sharing, retirement and savings plans, safety regulations, and much more. Copies are available from Wholesale Nursery Growers of America, 230 Southern Building, Washington, D.C. 20005, at $5 each.

The first volume in the series, entitled A Company Conversation, is a how-to guide on preparing an employee newsletter; it is available from WNGA at $2 per copy.

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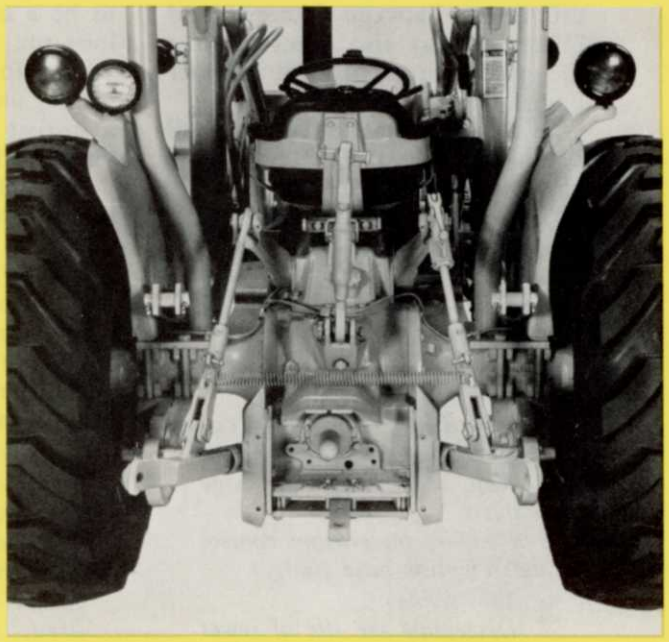

Draft links can be one-piece or telescoping. They are easily adjusted and the leveling crank can be locked.

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JOHN DEERE

JOHN DEERE on the move

PLANNING A GOLF COURSE

by Edwin Seay

To build and maintain a quality golf course and overall recreation facility, there is no substitute for proper planning. Whether it be the development of a new course or remodeling and updating an existing course, an early comprehensive Master Plan is essential.

If you were building a house, you wouldn't construct it room by room as you need the space. You would carefully decide what type of home would meet your needs, leaving options open for later changes or expansion. The same principle holds true for golf courses.

The early retaining of a golf course architect as a member of the consulting team can often make the difference between success and failure. It may also affect whether the project can be brought in under budget.

The following steps are all essential as part of the Master Planning phase:

1. Arrange for take-out and permanent financing so the project has ample funds for completing construction and for first-year maintenance.
2. Conduct an environmental impact study.
3. Conduct hydrological studies and make a flood report.
4. Run soil tests and slope analysis.
5. Conduct an erosion control and retention base study.
6. Test well(s).
7. Determine the site of sewer treatment plant, if required.
8. Conduct a tree study.
9. Determine the direction from which the facility will be served with utilities (electricity, gas) and drinking water.
10. Conduct a space analysis and determine preferred locations for the clubhouse, parking, maintenance, and supplemental recreational facilities like tennis courts, bathhouse and pool.
11. Determine the traffic circulation system and effects of and upon nearby residential developments.

The golf course architect can't make all the decisions about the building of a course, but along with members of the team, the architect can make the difference between a mediocre course and a great one.

And to keep a course at a high level of quality, the planning doesn't end when the facility becomes playable. Updating and remodeling have to be a continuing project. In the long run, continuous planning and supervision is less expensive than waiting until a course deteriorates to a point where it has to be remodeled.

Too often courses are remodeled in a haphazard way with no consideration of the effect on the overall facility. There is no better way to ruin a good course than hit and miss renovations.

Several steps should be taken as part of a remodeling program to insure the best results. They are:

1. Consult the golf course architect to gain his expertise in the project.
2. Obtain an up-to-date topographical map of the entire golf course and clubhouse grounds area, showing all physical features (buildings, roads, parking, trees, water, etc.) as well as greens, fairways, sandtraps and topography.
3. Obtain an up-to-date aerial photo of the course at same scale as 2 (one inch = 100 feet).
4. Meet with the architect and course committee to decide upon desired improvements.
5. Review the architect's improvement plan and make revisions to conform with your group's wishes.
6. After finalizing the Master Plan, have it adopted by your board of directors.
7. Have your architect provide you with an itemized cost estimate for the plan on a hole-to-hole basis.
8. In consultation with the architect, develop a priority schedule in manageable phases extending over two or three years.
9. Ask your board of directors to fund or budget the required money each year covered by the agreed-upon plan.

I can't emphasize enough the need for regular modernization of courses. I would estimate that at present as many as 50 percent of the courses in the U.S. are in need of some kind of remodeling. Adoption of Master Planning techniques can save these courses a lot of trouble in the future.

Proper planning can be financially beneficial as well as offering a great opportunity to keep facilities at a high quality level. For more information about Master Planning or for a list of golf course architects, contact the American Society of Golf Course Architects, 221 N. LaSalle St., Chicago, Ill. 60601. □

Mr. Seay is president of the American Society of Golf Course Architects.

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FEB. 6·11 1977

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TREE CABLING AND BRACING

by Robert Felix

Among the many services that the truly professional arborist has available for his clientele, cabling and bracing are the least appreciated until their need is demonstrated. After a storm, fallen trees, broken leaders and split crotches make tree owners very much aware of what might have been prevented had their trees been properly cabled or braced.

Is it the fault of the tree owner or the arborist? Many times a cabling and bracing job could have been provided as a preventative if the arborist had taken the time to diagnose the need and make the proper presentation to the tree owner.

Color photos of storm ravaged trees provide a good basis, not as a scare technique but as an illustration of what can happen. Diagrams illustrating how a Vee-shaped crotch becomes weaker as a tree grows are also helpful.

The use of threaded rods to add support to cavities or other weak structures is also well illustrated with photos.

Although preventative cabling and bracing is important, remedial treatment can be a valuable service available from the true professional. Needless to say many trees are critical to a particular landscape. If they are damaged in a storm it is imperative that every attempt be made to restore them.

Several years ago in early summer a tornado-like wind storm swept through a golf course in the northeast. An eastern red oak that had been guarding a green was badly twisted resulting in a three-inch opening in at the base of a vee crotch tapering down for about four feet. The top of the tree was somewhat broken but most of it remained intact. The tree was about 18 inches in diameter.

Without this tree the golf hole would be a simple drive and a wedge shot to the green. However the tree was positioned about 220 yards from the tee at the apex of a slight dog leg to the right. The spread of the tree was about forty feet providing an interesting hazard that made the hole a good par four.

If there was any possibility of saving this tree the golf club management was interested. There was no way that they wanted to lose this tree or attempt to replace it. A professional arborist was called in immediately and remedial steps were undertaken.

First a rope sling was installed about two thirds of the way up the tree between the two major leaders. A come-along was then attached and the two leaders slowly pulled together. When the leaders were pulled as tightly as possible, a ⅝-inch hole was drilled into the trunk every 12 inches from the base of the crack on up. Then a ⅝-inch wood screw rod was installed and firmly anchored on each end with large washers and nuts which were countersunk.

As the nuts were gradually tightened the fissure began to close at which point additional pressure was exerted with the come-along. This process was repeated until such time as the fissure was entirely closed. A 5/16 cable was then installed where the rope sling and come-along were attached to the two leaders. This cable was attached to ⅝-inch by 12-inch drop forged eye bolts which had been installed. These eye bolts were firmly anchored with washers and nuts which had also been countersunk. The cable was seven strand, soft lay, galvanized cable that was spliced through 5/16 thimbles running through the eyes of the eye bolts. No turnbuckle was used. The standard, two turn splice method was used.

As tension was exerted on the cable, the nuts at the ends of the threaded rods were tightened until all could be tightened no further. At this point an additional threaded rod was installed for added support about six inches above the crotch. However, the method of installation was entirely different. Although the same ⅝-inch threaded rod was used, the hole drilled was only 9/16-inch and did not protrude through the opposite leader. The rod was dead ended. The length that rod had to be was then determined by using a lesser diameter rod and the threaded rod to be inserted was cut ¾ of the way through so that it could be broken off inside the hole and the cambium could readily grow over it.

One end of the threaded rod was then inserted in the chuck of a low speed, ¾-inch drilled and threaded into the hole with the protruding threads locking into the sides of the smaller diameter hole. The scars resulting from the split were then backtraced and treated, the tree cut back, fed and nature left to take its course.

The tree recovered beautifully and is still thriving. Had a cable been installed previously perhaps the extensive damage might not have occurred.

Several years ago the National Arborist Association developed standards for bracing, cabling and guying shade trees. The purpose was to establish the classes and types of bracing cabling and guying used in the maintenance and repair of shade trees. These standards are available from the National Arborist Association, 3537 Stratford Road, Wantagh, New York 11793 for $1.25 each.

The situation and remedy described above illustrate the highly complex repair jobs that can be done using cabling and bracing techniques. Surely even more extensive repair jobs have been successfully completed.

When diagnosing a tree care situation keep cabling in mind. It is an important service as a preventative as well as a remedy. □

Mr. Felix is executive secretary of the National Arborist Association.

Meeting Dates

Louisiana Turfgrass Association Annual Fall Meeting and Equipment Show, Sheraton Motel, Alexandria, La., November 8-10.

Holly Society of America Annual Meeting, Stouffer's Valley Forge Inn, King of Prussia, Pa., November 9-13.

Landscape Maintenance Symposium, Mariott's Lincolnshire Resort, Lincolnshire, Ill., November 11-12.

Eastern US Horticultural and Landscaping Trade Exposition, Ocean City Convention Center, Ocean City, Md., November 12-14.

Delaware Turfgrass Conference, Clayton Hall, University of Delaware, Newark, Del., December 6.

International Plant Propagators' Society, Southern Region Inaugural Meeting, Sheraton Inn, Mobile, Ala., December 7-9.

University of Maryland Corn Technology Conference, Civic Center, Salisbury, Md., December 9.

University of Maryland Agronomy Short Course, National 4-H Center, Chevy Chase, Md., December 13-15.

Connecticut Nurserymen's Association Annual Meeting, Ramada Inn, North Haven, Conn., December 28.

Western Association of Nurserymen Annual Meeting and Trade Show, Hilton Plaza Inn, Kansas City, Mo., January 2-4.

North Carolina Nurserymen's Association Short Course and Trade Fair, Royal Villa Motel, Raleigh, N.C., January 2-4.

Northeastern Weed Science Society Annual Meeting, Baltimore Hilton Hotel, Baltimore, Md., January 4-6.

Indiana Association of Nurserymen and Indiana Arborists' Association Annual Winter Meetings, Stouffer's Inn, Indianapolis, Ind., January 4-6.

Garden Living Industries of the Eastern US Annual Convention and Trade Exposition, Concord Hotel, Kiamesha Lake, N.Y., January 4-7.

Iowa Nurserymen's Association Annual Convention, Roosevelt Royale, Cedar Rapids, Ia., January 5-7.

Mid-Atlantic No-Tillage Conference, Sheraton Inn, Gettysburg, Pa., January 7.

Wholesale Nursery Growers of America Membership Meeting, Hyatt Regency-O'Hare, Rosemont, Ill., January 9.

National Association of Plant Patent Owners Membership Meeting, Hyatt Regency-O-Hare, Rosemont, Ill., January 9-10.

Louisiana Association of Nurserymen Short Course and Convention, International Motel, New Orleans, La., January 9-11.

Continued

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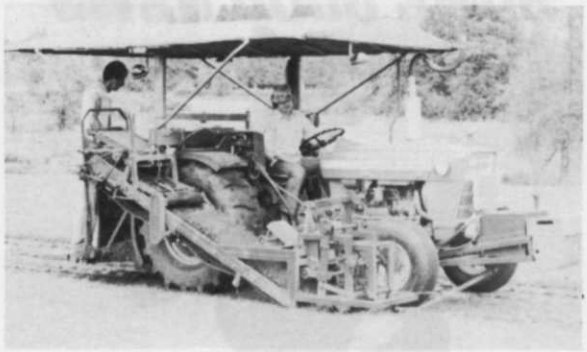

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Meeting Dates

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Mid-America Trade Show, O'Hare International Trade and Exposition Center, Rosemont, Ill., January 9-12.

Mailorder Association of nurserymen Membership Meeting, Hyatt Regency-O'Hare, Rosemont, Ill., January 10.

New Jersey Association of Nurserymen Annual Winter Meeting, Governor Morris Inn, Morristown, N.J., January 11-13.

Maine Nurserymen's Association Annual Meeting, Augusta Civic Center, Augusta, Me., January 13.

Landscape Materials Information Service Winter Meeting, The Biltmore, New York, N.Y., January 13.

Kentucky Nurserymen's Association Annual Meeting, Galt House, Louisville, Ky., January 14-15.

South Carolina Nurserymen's Association Short Course, Mills Hyatt House, Charleston, S.C., January 16-18.

Mid-Atlantic Nurserymen's Trade Show, Hunt Valley Inn, Cockeysville, Md., January 17-19.

Landscape Ontario Congress, Four Seasons Sheraton Hotel, Toronto, Ont., Canada, January 18-20.

Connecticut Nurserymen's Association Short Course, Northeast Utilities Auditorium, Berlin, Conn., January 19-20.

Georgia Nurserymen's Association Winter Meeting, Holiday Inn, Athens, Ga., January 19-21.

Utah Association of Nurserymen Convention, Wahweap Lodge & Marina, Page, Ariz., January 19-21.

Washington State Nurserymen's Association Convention, Everett Holiday Inn, Everett, Wash., January 20-22.

International Society of Arboriculture, Ohio Chapter Annual Meeting, Sheraton-Columbus Hotel, Columbus, O., January 23-25.

National Tropical Foliage Short Course, Sheraton-Towers Hotel, Orlando, Fla., January 23-26.

Ohio Nurserymen's Association Trade Show, Sheraton-Columbus Hotel, Columbus, O., January 23-27.

Ohio State University Short Course, Sheraton-Columbus Hotel, Columbus, O., January 23-27.

Associated Landscape Contractors of America Trade Exhibit and Annual Meeting, Riviera Resort Hotel, Palm Springs, Calif., January 23-28.

Northwest Agricultural Show, Multnomah County Expo Center, Portland, Ore., January 25-27.

Massachusetts Horticultural Congress, Howard Johnson's 57 Motor Hotel, Boston, Mass., January 26-27.

Del-MarVa Soybean Meeting, Civic Center, Salisbury, Md., January 27.

Tropical Plant Industry Exhibition, Diplomat Hotel, Hollywood-by-the-Sea, Fla., January 27-29.

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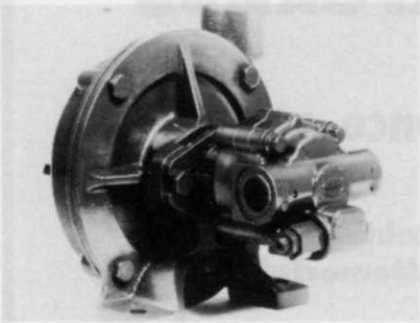

pressure couplers. This convenience works with a flush seal to avoid leaks of fluid loss and helps the device connect and disconnect under full pressure. It measures ½ inch and finds use on any OEM design.

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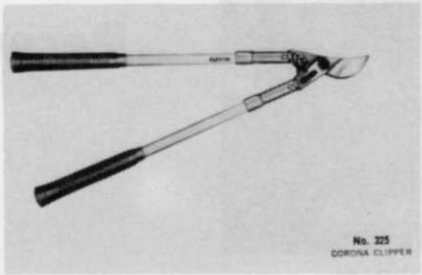
Corona Clipper Co. is introducing a new No. 325 lopper designed to prune with less fatigue and greater ease. The product uses fiberglass handles which are bolted on to a



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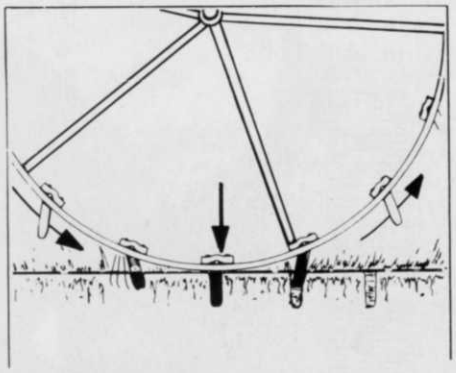

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Gorilla-proof sprinklers or It's a Jungle out here

Interesting reactions to irrigation sprinklers have been displayed by endangered and not so endangered species of animals that inhabit San Diego's fascinating Wild Animal Park. Elaborate sprinkler and drip irrigation systems maintain the jungles, compounds, mammoth aviary and exotic gardens in the 1,800-acre park in the subtropical hills near the Southern California community of Escondido.

Three million people have visited the park since it opened four years ago. They can see it by walking and also by riding quiet, pollution-free, electric safari cars that traverse a five-mile route through the compounds.

Sprinklers of various sizes distribute most of the 850,000 gallons of water that the park consumes every day. Irrigated are the 600 acres of the park that are nearly developed.

Many sprinklers are in compounds with the animals and irrigate grasses and plants on which the animals browse. The animals, some of them endangered species, have reacted in a variety of ways to living with sprinklers.

The elephants and elands make good use of them. The elephants seem to enjoy waving their trunks through the streams of water. On warm days, the graceful elands are apt to lie in the paths of the spray.

But the gorillas and lions react in a most negative way. The gorillas are the most demonstrative. The nails of their little fingers are especially strong, says Park Horticulturist Jim Gibbons, and they use them to pry out the sprinklers in their compound. The gorillas accomplish this even though the sprin-

klers, like many in the park, are sunk below the ground in concrete collars and pop up when the water is turned on.

"We need gorilla-proof sprinklers!" commented Gibbons.

He could use lion-proof ones also. The great cats simply rip out the sprinklers with their claws. The tigers react differently again. They apparently are not annoyed by water and ignore the sprinklers entirely. So do the white rhinos, which are rather ponderous animals. They sometimes step on the concrete collars and snap the risers, not out of aggravation but simply out of ignorance.

More predictable and positive to the elaborate and extensive irrigation systems at the park is the response of the many varieties of plants. Grasses, bushes and trees are combined by skillful landscaping into looking like glamouous replicas of the African and Asian habitats of the animals.

Most of the 15,000 sprinklers in the park are Rain Birds because, as Gibbons explains, that company makes a sprinkler for every purpose and its consulting and engineering facilities are excellent.

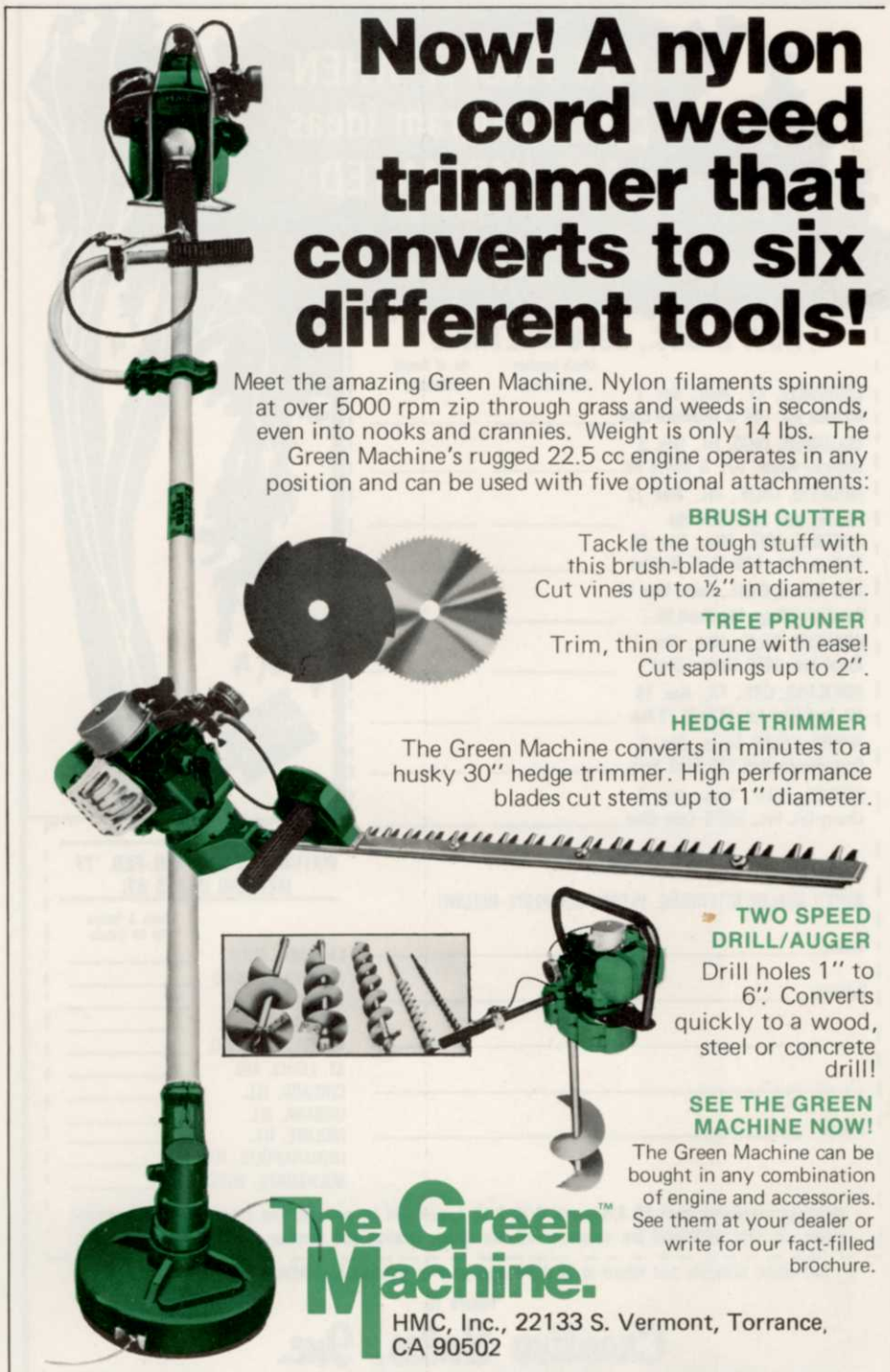
Most of the irrigating is automatically timed by electric controllers. Power for the timers in the more remote areas is provided by batteries. Most pop-ups are set in concrete collars and are operated by valves that open and close slowly to prevent any sand in the water lines from clogging the valves.

Many of the sprinklers water native California grasses and experimental grasses in the large 100-acre compound in which a variety of animals live together: rhinos, elands, impalas, giraffes and other hoofed animals. A species of bird such as the great hornbill lives with them too. The hornbills are great black birds that don't fly. Zebras had to be removed from this community because they tended to kick the young of their neighbors.

Many of the animals in the 100-acre compounds are browsers, feeding on the indigenous fescues, bermudas and other grasses. Some of the irrigating in this compound is done with big guns which throw water for a radius of 150 feet. These sprinklers remain above ground and are protected by piles of heavy rocks.

The principal diet of the browsers is not grass but hay and acacia trees. The park maintains an orchard where acacias are grown. These trees are cut when they are 20 feet or so high and are tied upside down onto big trees in the compound. Tender acacias are a favorite diet of the browsers, the animals consuming 20 of the trees a day. The orchard is expanding and plans call for a stand of more than 3,000 trees.

On hilly land, the orchard is irrigated with a drip system. Water is dripped slowly into the ground from outlets located in the vicinity of each tree. Drippers prevent evaporation, maintain good soil moisture—even on steep hillsides — and discourage weeds because they irrigate



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gorilla-proof sprinklers

only the desired plants.

Many golf courses and parks fertilize through their sprinklers. However, this isn't possible at the San Diego Wild Animal Park because it is linked with the Escondido municipal water system via a ten-inch asbestos main. The park administration wants to avoid the possibility of contaminating the city water. So fertilizing is done by helicopter.

Water in the park is used at least twice. The park has its own sewage system which is yielding purified, nitrogen-rich water that is reused through a separate sprinkling system.

The park makes good use of indigenous grasses and other plants, such as the wild evergreen shrub called California buckwheat, and more exotic plants such as rocket pincushion from South Africa. The latter grows wild in southwestern Cape Province and reaches a height of ten feet. It has a brilliant red flower.

More than 50 acres of the park have been planted with a new technique — hydro-seeding. Seed, mulch and fertilizers are mixed in a tank and pumped out through nozzles onto the desired terrain. The seeds are protected by the mulch and nourished by the fertilizer. Grasses are started this way and even eucalyptus trees. It's a fast way to cover hillsides and valleys with green.

The San Pasqual Valley in which the park is located enjoys a climate and topography very much like that of South Africa, Gibbons observed. The Southern California valley, 30 miles north of downtown San Diego and still within the city limits, is a bit colder than Africa in winter. Last winter — an unusually chilly one — the thermometer dipped to 22 degrees above zero. The temperature can climb to 100 degrees in the summer.

The park has more than 2,200 wild animals living in settings much like their own native haunts in Africa, Asia and Australia. They are thriving and multiplying.

The park is operated by the Zoological Society of San Diego for the preservation of wildlife. Gibbons proudly declared that the white rhino no longer is on the endangered list because it has enjoyed a population boom at the Wild Animal Park and in several zoos.

In 1975 more than 25 endangered species babies were born at the park, including two gorillas and an Arabian oryx. The previous year 14 of the 19 endangered species at the park added to their respective populations.

As Dr. James Dolan, curator of San Diego Wild Animal Park, said: "The park is fulfilling its primary purpose — to preserve endangered species and to serve as a haven for vanishing wildlife." □

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PHOENIX, ARIZ., Mon., Nov. 15 Rodeway Inn., 24th St. & Buckeye		
SAN DIEGO, CALIF., Tues., Nov. 16 Vacation Village, Ingraham St.		
ANAHEIM, CALIF., Wed., Nov. 17 Royal Inn, 1855 Harbor Blvd.		
PORTLAND, ORE., Fri., Nov. 19 Mt. Scott Com. Ctr., 5530 SE 72 Ave.		
IRVING, TEXAS, Thurs., Dec. 2 Ramada Inn West, 120 Airpt. Frwy.		
DENVER, COLO., Tues., Dec. 7 Cherry Crk. Inn., 600 S. Colo. Blvd.		

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Fusarium wilt hits Texas shade trees

Two Texas shade trees, the mimosa and the mulberry, are suffering from fungus diseases.

Dr. Wendell Horne, a plant pathologist for the Texas Agricultural Extension Service, says the mimosa tree is being removed from the Texas landscape by Fusarium wilt. The fungal organism that causes the disease had its origin on the eastern seaboard and has spread westward in recent years.

The wilt, which also occurs in cotton, peas and watermelons, results from spores that become airborne after lying dormant in the soil. It affects plant vitality and the leaves. The tree later shows symptoms of color loss and droopiness and cracks along the bark soon appear, emitting a foul smelling sap.

Two resistant varieties of mimosa trees, Charlotte and Tyrone, are currently being used but not to a great extend in Texas, notes Horne. Furthermore, chemical controls for the disease are not profitable at this time. About all homeowners can do is to give the trees good cultural care and to avoid mechanical injury.

The mulberry tree is afflicted with a fungal leafspot disease during the autumn months. This shade tree loses its leaves as a result of a windborne fungus that produces the disease, explains Horne.

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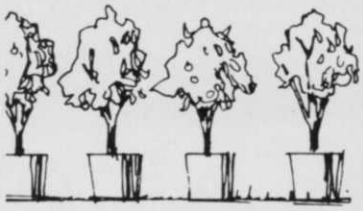
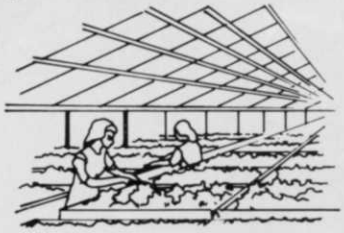
Nurserymen find Horticultural Perlite practically indispensible for **container grown plants and shrubs** because of its ability to retain moisture, and to keep the mixture around the root environment loose. It is also a great "starting mixture" for transplanted stock as it helps reduce the incidences of transplant shock. And because Horticultural Perlite is sterile and non-toxic, it won't rot, decompose, disintegrate or break down. Nor will it help promote insect life. Being light in weight, Horticultural Perlite makes container moving light work and shipping costs a lighter expense. It's not only ideal for your plants — Horticultural Perlite is ideal for your business.



For **plant propagation**, Horticultural Perlite soil mix is almost as important as sunlight. Because of its water-retention characteristics, this mixture maintains an even distribution of moisture to stimulate fast root development in cuttings and to speed seed germination. Most important, by keeping the starting mixture loose, Horticultural Perlite permits a freer flow of oxygen to help nurture the new growth. This also makes transplanting easy; without root damage; and without undo shock. Horticultural Perlite is inert matter that can last indefinitely in your seed beds. It is sterile, odor-free and can't promote insects or bugs. It is a great asset for the new beginnings of plant life.



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City trees more insect vulnerable

A city dweller who plants a forest tree in his front yard today is perhaps as foolhardy as the misguided soul who accidently introduced the tree-destroying gypsy moth into the hardwood forests of the United States in the 1870's.

D. G. Nielsen, entomologist at the Ohio Agricultural Research and Development Center, makes this comparison to show that man's meddling with nature is making it easier for some insects to attack and damage trees.

Forest trees planted in the hostile urban environment of polluted air, high velocity wind currents, insufficient light and water, and extreme temperature fluctuations often have less vigor than their counterparts in the wild. Nielsen says this makes trees along city streets more susceptible to insects which would not normally bother them in the woods.

For example, in the forest the bronze birch borer prefers mature trees or those in poor health. Actually, the insect provides a "service" to the forest by weeding out sick and old trees to allow more room for young healthy trees. However, in the city the birch borer will attack apparently young healthy trees. Nielsen says these trees are probably suffering from water stress in their foreign surroundings which make them more vulnerable to their insect enemies. Insects will attack a stressed tree in the urban environment just as they will attack a sick or old tree in the forest.

Nielsen says that since people will continue to plant trees in the city, some insects will take advantage of the situation. The problem is knowing when the insect population will change from being harmless to destructive. Some people will "jump the gun" and use a pesticidal spray because they see all insects as threats. What many people do not understand is that most insects are harmless and some even beneficial in their relationships with trees.

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HELP US HELP YOU be a better professional in the Green Industries.

Winterize your trees

Lab findings may alleviate tree mortality

To a tree, Greg Brown is a "cold" person.

On more than one occasion he has calmly watched little seedlings freeze to death.

Then he has torn apart the seedlings — right down to their cells — to find out why some trees are more cold-hardy than others.

The "autopsies" are beginning to pay off. The University of Missouri-Columbia professor of forestry had identified factors ranging from a "supercooling" phenomenon to a built-in "antifreeze" that could help us have more cold-hardy trees in the years ahead.

He and his colleagues have isolated and identified a glycoprotein (a protein bound with sugars) which binds the water in the cells and keeps it from turning into ice. They found the glycoprotein in black locusts, well-known for their hardiness. Similar glycoprotein has been found in fish which live in the Antarctic Sea.

Brown's basic research findings will be used by plant breeders who will now be better able to select for cold hardiness. Others will use his information to develop chemicals that will stimulate plants to produce glycoprotein or other forms of plant "antifreeze."

Manufacturers are already selling cyro (cold) protectants which basically slow plant growth. "Dormant plants are more hardy," explained Brown.

The UMC research will help protect trees from early fall freezes and late spring freezes — something that would be worth millions of dollars to the fruit and nursery industries.

"And by extending a tree's hardiness, we could introduce desirable species into areas where they couldn't grow before," said Brown.

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25 gpm output at 600 psi

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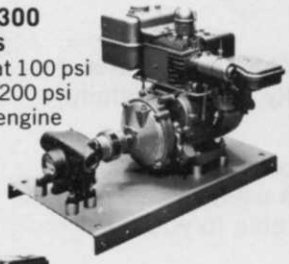
Choice of rubber or nylon rollers

Series 6300 6-Rollers
6.9 gpm at 100 psi
6 gpm at 200 psi
4 hp gas engine



Series 7560C 8-Rollers
10 gpm at 200 psi with 4 hp engine

Write for complete pump catalog or request pump recommendation for your need.

Hypro / LSi®
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Study predicts 4.5% growth in lawn, garden, houseplant chemicals: $650 million in '75

U.S. consumers spent $650 million at the manufacturers' level in 1975 for pesticides, fertilizers, potting soils, and related chemicals for lawns, gardens, houseplants, and general household use, a new 18-month survey reports. Fertilizers, which are used on lawns, gardens, and potted plants, are the largest category with 46 percent of the market, followed by insecticides with 27 percent.

Although the overall business is forecast to grow at a steady yet not spectacular rate of 4.5 percent to 1980 (as measured in constant 1975 dollars), several products are forecast to far exceed the average, according to C. H. Kline & Co., marketing consultants. The most rapidly growing products will be houseplant fertilizers, pesticides, and potting soils, the survey reports. The major reason for the growth of these products is the increasing popularity of potted plants.

According to Kline, over 750 million houseplants are maintained by nearly 60 million households, or an average of 12.5 plants in each household. Although hundreds of different varieties of plants are offered, ivy, philodendron, cactus, fern, and wandering jew are the most popular. Many plants are fertilized and otherwise cared-for regularly.

Certain other segments of the overall business are also growing rapidly, according to Kline. For example, supermarkets and discount stores are becoming leading retail outlets for these products and women are becoming more important purchasers of garden chemicals.

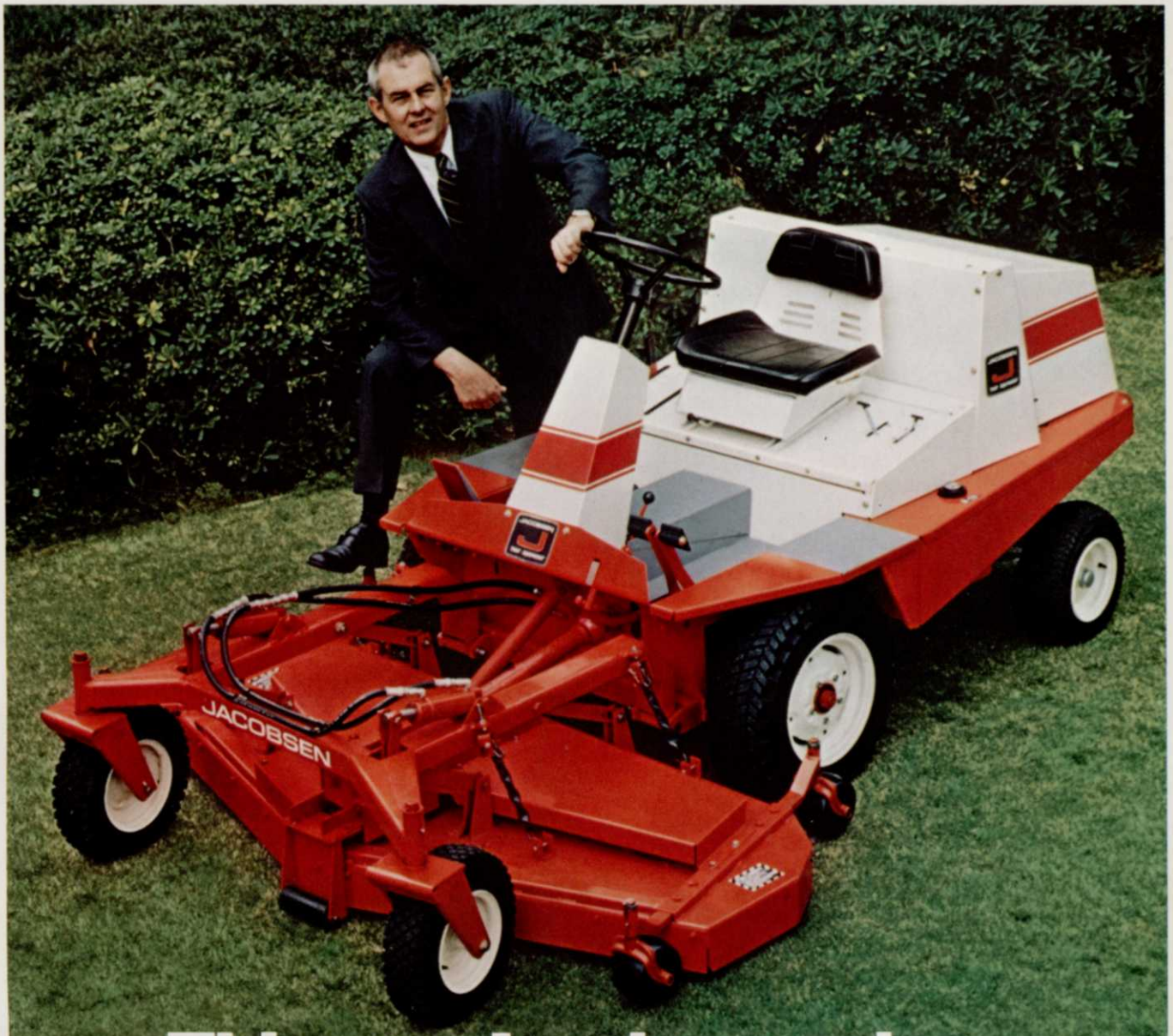
Changes in retail distribution and the growth of small-packaged houseplant chemicals have attracted many consumer product companies to this business because of their skills in selling to mass marketers. Among the recent entrants are 3M, Alberto-Culver, Gillette, and Pfizer (Leeming/Pacquin).

According to the study, however, the overall market is dominated by three companies: O. M. Scott, a division of ITT (lawn fertilizers); Standard Oil Co. of California's Ortho Division (outdoor pesticides); and S. C. Johnson & Son (household insecticides). These three together controlled 29 percent of the overall market in 1975 with the remainder split among small regional companies. In all, about 250 companies market lawn, garden, and houseplant chemicals in the U.S.

Private labeling of theses products is an important aspect of the overall business. Kline reports that roughly 15 percent of all manufacturers' sales, including 25 percent of all potting soils, 15 percent of all fertilizers, and 15 percent of all soil conditioners and mulches, are made by private-label manufacturers.

Lawn, Garden, and Houseplant Chemicals 1976 is based on analysis of 1,697 interviews, including 166 in-depth interviews with executives in the industry, government agencies, and trade associations and journals; 1,004 telephone interviews with a national probability sample of individual consumers; and 527 interviews with retail outlets.

The study is part of a two-survey analysis of all off-farm applications for fertilizers and pesticides. The companion survey *Professional Markets for Pesticides and Fertilizers*, covers the market for these chemicals in 16 end-use industries including highways, golf courses, mosquito-abatement operations, and railroads. Information on both surveys is available from C. H. Kline & Co., 330 Passaic Avenue, Fairfield, N.J. 07006.



This new Jacobsen rotary mows, trims, mulches, sweeps, shovels and plows snow. Wow.

The good news in the picture is this brand new Jacobsen Out-front Commercial Rotary Mower.

Just ask Jim Walker of Outdoor Equipment Company in St. Louis about it. Like the rest of us, he's excited about this husky workhorse that can mow up to 30 acres a day.

He'll show you how it can climb curbs, trim around trees, and even perform a zero turning radius. He'll adjust the seat forward and backward for leg comfort.

He'll show how to mow up to 6 MPH, and then hydraulically raise the cutter deck and whip along at 14 MPH to another mowing site. And how the cutter deck tilts up and down for mowing gullies and bank edges.

That's not all. He'll show you how to attach the optional accessories like the leaf mulcher. Or the 60" snow plow. Or the 54" 2-stage snow thrower. Or the 60" rotary broom. And the protective cab for cold weather.

There are a lot more big features you'll want to know about. So you'd better ask your nearest Jacobsen distributor for an eye-popping demonstration.

It's the last word in out-front rotaries. And that word is "wow!"

Your Jacobsen Distributors

Great products deserve great service.

For the name of the distributor near you write: Jacobsen Turf Distributor Directory, 1721 Packard Avenue, Racine, Wisconsin 53403

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"In Canada, it normally takes two years to raise a sod crop, but with baron,* it takes only one. That means twice as much profit."

"During the winter of 1973-74 there was a lot of ice and was followed by 20° below zero temperatures. I lost some of my sod crop, but I lost less than sod farmers who didn't use Baron."

"It has been my experience that baron requires less fertilizer than other bluegrass. And, at today's price of fertilizer, that's important to me!"

*U.S. Plant Patent #3186 Dwarf Variety

"I've always been proud of my sod, but since I've been using Baron, I've got even more reason to be proud because Baron is #1. I've been using a Baron Kentucky Bluegrass mixture on every acre of sod I grow, and I'll use Baron on every acre next year, too."

"Baron stays greener in the fall and greens up earlier in the spring than other bluegrass. And, it's heartier, too. I've never lost a roll of Baron sod during loading, carrying and unloading. The root system with Baron makes twice as many roots as other varieties."

"The summer of 1974 was extremely dry. But Baron proved that it's very resistant to drought. With Baron I didn't have any problem with disease. . .and I found Baron Kentucky Bluegrass to be weed free. That's important to me."

"Since I've been using Baron, too many people want my sod. . .I don't have enough. See my name on this old truck? That's all the publicity I need. A good producer doesn't need any more. When I say my sod has Baron in its mixture, people know I'm a good producer."

Jean Paul Lauzon has been growing sod for 27 years and is considered by many to be Canada's best.

There's not much more we can add to Jean Paul's comments except that Lofts Pedigreed Seed, Inc. or any authorized distributor is ready to serve your needs wherever you grow sod.

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